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in general, and especially to the management of finance; and even if they be theoretically acquainted with mining it would be better, although this is of less importance than the other qualities. On their arrival in Mexico these gentlemen would have to use great judgment in the selection of the mines to be worked, and they should be instructed to take good information from the most reliable sources before making contracts with the owners. When a favourable locality and a promising mine or mines may be met with, they should engage the services of one of the many excellent European miners who are resident in the republic, and who, being already acquainted with the lodges of the country, and the manners and habits of the native workmen, are infinitely superior to the best miners who could be dispatched from England. A house should be taken of moderate pretensions, and only such assistants engaged as might absolutely be required, again availing themselves of the European residents in the country, rather than fresh hands from England. The salary of these agents should be moderate, but as a stimulant to exertion they should have allotted to them an interest of so much per cent. on the actual profits realised. They should be instructed to furnish by every opportunity plain reports of proceedings, with maps of the interior works of the mines, and each three months a financial statement of expenditure, which documents should be exposed in the office at home for the information of the shareholders.

A capital of 100,000*l.* is more than sufficient for the working of four good mines, of which only one-half would be required for some time; there are many such mines, and the only requisite would be judgment in the selection and economy in the working,—in short, if the same caution, activity, and intelligence, were to be devoted to a company as is every day given to a private house of business, success would be almost certain. I cannot conclude without expressing a hope that the day will arrive when English capital will once more be devoted to the working of mines upon a sensible and business-like basis; and that Mexicans, forgetting past follies in view of the actual common-sense pervading the management of any new company which may be established, may cease to characterise any particularly foolish act by the expression—“*Loco como un Ingles.*”—July 8.

II.—*Excursion to an Ancient Volcano in Mexico.** By HENRY DE SAUSSURE.

Communicated by Professor PAUL CHAIX, of Geneva, Corrig. F.R.G.S.

Read, June 27, 1859.

To the south-west of the valley of Mexico stretches the verdant province of Mechoacan, deservedly reputed as the garden of the republic—a broken, undulating country, enjoying a temperate climate, and watered by numerous streams. When the traveller enters those fine meadows, after having long been tired with the sandy plains of Anahuac, and the marshy flats of Mexico, he feels particularly delighted at the sight of those wooded hills intersected by verdant plains, cool, refreshing streams, and smiling lakes,

* In giving an account of our excursion to this mountain, I do not assert that it had never been seen by anybody, for it was well known by the people of the neighbouring district; but no traveller ever suspected its existence, and the inhabitants of the capital were in utter ignorance of it.

dotted with many islets, clothed in the most luxuriant vegetation. In other parts of that fertile country mountains of a more savage appearance conceal in their bowels those metallic treasures, the only remaining source of wealth of the Spano-American republics. The most flourishing of those districts is Angango, which borders on the state of Mexico on its eastern frontier.

I left the above-named place on the 6th of August, 1855, and travelled west towards the village of Taximaroa, avoiding as best we could the numerous bands of robbers which the revolution had let loose over the country. I had received obscure indications of the existence of a great mountain, called *San Andres*, in those parts, but could not easily procure a guide. That broken country is completely covered with forests, so thick as to preclude any distant prospect, and even the sight of the highest and nearest mountains; so that we could not see the *San Andres*, although we were assured it was at no great distance from Taximaroa. All the great mountains in Mexico rise with so gradual a slope, that from their base nothing is to be seen except the hillocks on which they rest.

It seems that a short trip might have carried us to one of the summits of the mountain direct from Taximaroa; but the Indians of that country are sunk into such a degree of obtuseness or apathy that it was impossible to sift any information out of them, and we were apprised afterwards that a whole day had been unnecessarily spent in marching round the mountain. It is no doubt owing to the sullenness of the inhabitants that the base of the volcano of *San Andres* has been skirted by former travellers without their being made aware of its existence.

The day was already far spent when our little caravan entered the vast forests by which the foot of the mountain is clothed. We were in the middle of the rainy season, and did not advance much before one of those tropical storms, which are of daily occurrence in the evening, burst upon us. Darkness overtook us in the middle of those endless solitudes, and our guide took advantage of it to slip from us, and vanish in the thicket. Being left to our own guidance in a critical position, we had nothing to do but to feel our way as best we could along a narrow and broken path, where our loaded mules tumbled at every impediment they met with. The moon, however, lighted us along for hours to a welcome glade, where we found a temporary shelter in a cluster of Indian huts. We were then apprised that, instead of ascending towards the summit, we had been merely travelling round its base, and that nothing better was left for us to do than to pursue that same course towards the north for eight leagues more. We were fain to do it; and, on arriving at the village of Jaripeo, we were greatly relieved from our troubles by meeting there several Frenchmen, who kindly assisted us in carrying out our projects.

The vast forests of oak and fir with which all the mountains are clad in Mechoacan might procure infinite resources to that country ; but the people want the most elementary industry. Ignorant as they are of the use of the saw-mill, not to mention the saw and even the axe, they do not use the fine timbers that lie at their doors for the building of log-houses, bridges, boats, or rural implements of any kind. They are incapable of making planks, and live in wretched Spanish hovels made of earth or stone, without windows, roofless and floorless. Rivers are merely forded. The rise of their waters often compels the troops, convoys of merchandise, and travellers to tarry for weeks on their lonely banks, and government messengers are frequently drowned with the mails. Nevertheless the whole nation, accustomed to endless patience, prefer submitting to those inconveniences, which they consider as a tribute unavoidably paid to nature, to establishing bridges or ferry-boats, which their laziness induces them to think achievements beyond their power. To men whose aim is not beyond avoiding starvation, the most necessary implements are unknown. I was therefore not a little surprised to alight, at Jaripeo, upon a cluster of houses regularly built with timber, well-fenced premises, and a large saw-mill at work. Wherever an European happens to settle he soon works a complete change upon the neighbouring country, and thriving villages are seen rising where his industry adds the least improvement to the savage ignorance with which old Spain had endowed her former colonies. Thus I had much cause of congratulation in having missed the right path ; for the kind owner of Jaripeo apprised us of his having set up, on the volcano, a sulphur-manufactory for the making of gunpowder, so much wanted in the neighbouring mines. Although I had been for several days very ill from fever, I did not hesitate to undertake the ascent of the mountain, being stimulated by the hope of finding there many interesting curiosities, and, leaving our pack-horses at Jaripeo, I started at daybreak in company with Mr. Peyrot.

All the volcanoes in Mexico are of easy access, and the ascent may be performed on horseback to a very great height on the gentle slope of their sides ; but they are so thickly overgrown with immense forests, that both the horizon in the distance and the top of the mountain are shut out of the view by immense heaps of decaying secular trees, sheltering a world of parasitical plants and animals. After having for a while enjoyed in high spirits the novelty and magnificence of that vigorous and gigantic vegetation, a traveller is not long, however, before he feels tired with its monotony. With the San Andres, which spreads over a vast extent of country, the uniformity is pleasantly relieved by extensive horizontal glades, which call to mind the dried-up basins of former lakes. Its slopes are broken by plains and clusters of parasitical

dome-shaped hillocks, rising by a succession of gigantic steps to a vast table-land, from which a rounded rocky summit is seen towering.

The narrow path which leads from Jaripeo to the sulphur-works winds about those impenetrable forests, sometimes wading through the marshy ground of the above-mentioned flats, and very often engaged in deep ravines and dangerous chasms. The body of the mountain is wholly made of a bluish perlstein trachyte, much fissured by an infinite number of veins of obsidian. This last stone occurs in dykes, so thick that in many places men and horses are literally treading upon volcanic glass. All the plains in the neighbourhood are of the same nature, being besides covered with basaltic eruptions, which have by innumerable rents broken through the ground during the eruptions from the volcanic mouth.

After a march of several hours, we came to a rocky amphitheatre, where the most curious scene broke suddenly upon our view. At the bottom of a funnel-shaped cavity was a circular pool more than a hundred yards in breadth, filled with dark and boiling water, from which clouds of mephitic vapours were seen rising. The sides of the amphitheatre are all around bare rocks, mouldering and whitened by these sulphureous vapours and the deleterious pool. The rocks are besides completely marked with streaks and irregular circles, red and yellow, while a narrow stripe of scanty vegetation crowns the upper part of the cliffs. The struggle of nature striving against deleterious emanations gives the place a sad and savage appearance. The pool of warm water in the centre is very likely of great depth, judging from the rapid slopes of its banks. It is from its bosom that sulphur is obtained, mixed with mud; and it next undergoes the process of purifying by melting. A few earthen hovels and a small factory have been built in that lonely place, to carry on the manufacture, in a part of the mountain better sheltered from the miasms by its distance from the lagoon. But the action of sulphureous gas is still powerful enough to change the clay of which they are built into various sulphates, especially alum, so that the buildings still crumble down from time to time.

The latter part of the day was employed in exploring several parts of the mountain, under the guidance of two Indians, and we found our way up to a higher valley by using the hatchet through the dense underwood of a forest surpassing anything we had previously seen in the mountains of Mexico, by the extraordinary vigour and majesty of its vegetation. The ground was covered with gigantic trunks confusedly heaped under the dense foliage of the living trees; and whenever we attempted to cross over those prostrated giants by treading on their bark, they suddenly yielded, crumbled to dust, and buried us under heaps of mouldering wood and a thick jungle of ferns and other plants.

For about half an hour our attention had been excited by a strange noise resembling the rush of a cataract in the distance, when we saw a powerful column of white steam, throwing up its fleecy clouds into the air with a violence which carried them above the tops of the fir-trees that clothed the slopes of the valley. On reaching the place whence the noise originated, we were struck with the grandeur of the scene which burst upon us. The ground rose in front with a slope, covered with blocks of stone resembling china, and an immense spout of steam rushed at the top to a considerable height from an opening resembling a well two yards in diameter. The same well gave vent to an abundant spring of boiling water, which flowed down the sides of the valley, divided into several streams. That phenomenon may be compared only with the Geyser in Iceland, and its results are the same. The waters discharged by the well cover the ground with a large quantity of siliceous matter which increases the size of the stones over which they flow; their surface is at first soft, like a kind of paste, and being hardened by time, takes the appearance of compact opal.

Other curiosities are still to be met with on the slopes of the San Andres. Not far from the steam-spouts, and in the same valley, another warm spring is seen issuing from several small basins, which seem to have been carved by the hand of man; but it is remarkable only for its temperature, being little inferior to that of boiling water.

We went on through the woods, following our Indian guides, gradually rising along the sides of the valley, and, within the narrow limits of half a league, we suddenly reached another deep chasm surrounded by banks so steep that they threatened to crumble down under the pressure of our feet. At the bottom of the hollow we saw a pool of muddy water in a violent state of ebullition. It was alternately swelling, then throwing up foaming floods of boiling mire, and subsiding again. The stems of several fir-trees, which had been precipitated into that cauldron from its steep banks, were actually undergoing the process of cooking, tossed about in the muddy pool like vegetables in a boiling pot. At the sight of that new volcano we could not help shuddering, and retreated precipitately from its banks, from which we might so easily have been hurled down and met a horrible death.

It is not unlikely that the San Andres has other phenomena worthy of being seen; but the traveller is prevented from exploring it easily by the impenetrable forests which clothe it. In a later excursion which I made from the sulphur-manufactory, I came to an extensive glade occupied by a lake of bitter water, doubtless fed by subterraneous springs. Nothing is more mournful than the appearance of that dark sheet of brackish water, notwithstanding the stately forms of the trees around, and the presence of a number

of stags, parrots, and aras to enliven it. I was besides seized with a fit of ague, which made it impossible for me to pursue my exploration of the mountain, especially the Cerro Grande, a summit that rises above the limit of trees. Having reached the San Andres, after numerous accidents, which broke all my instruments, I was thereby prevented from taking any measurements of its height, which I might at random suppose to be above 4000 yards. It is, however, teeming with so many objects of observation that I may be allowed to hope it will be visited by geographers and geologists, who will be able to fill up the blanks of this my first excursion. I must caution them against an error which might cost them much time, namely, that of mistaking the name of the volcano for that of any neighbouring place or village, which is very often the case in desert countries, where mountains and rivers are nameless, or borrow their name from a town—as it is indeed the case with the famous Pico de Orizaba, which is also very frequently named after another neighbouring city, San Andres, the Cholchicomula of the Mexicans.

III.—*Some Account of the Lake of Yojoa or Taulebé, in Honduras, Central America.* By E. G. SQUIER, Esq., of the United States of America.

Read, January 10, 1859.

THE lakes of Central America are among its most interesting physical features, and, next to its volcanoes, most likely to arrest the attention of the intelligent traveller. The large and beautiful lake of Nicaragua, the *Cocibocca* of the aborigines, and its dependent lake of Managua or Leon, the first 120 and the second 60 miles in length, are those best known, principally on account of the facilities which they are supposed to offer in connection with the project of opening water communication between the Atlantic and Pacific Oceans. After these, we are best acquainted with the volcanic lakes of Masoya in Nicaragua, Ilopango in San Salvador, and Amatitlan and Atitlan in Guatemala. The lake of Itza, often called Peten, in Vera Paz, remarkable for its historical associations, has lately been visited and described by an intelligent traveller, M. Monclet, and has thus been brought within the range of modern geographical knowledge. Like Atitlan in Guatemala, and Masoya in Nicaragua, it is without an outlet; but, unlike them, betrays no evidence of volcanic origin. It is a closed reservoir, within which is collected the drainage of a considerable terrestrial basin; and in consequence of receiving the waters of a number of streams without any apparent outlet,